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Description

This invention relates to a flavor delivery system or use in comestibles such as chewing gum compositions, confectioneries, pharmaceuticals and food and beverage products. More particularly, this invention relates to a delivery system which provides enhancement of flavor and sweeteners with a controlled sustained release and intensity. The delivery systems use a flavor enhance with the encapsulating matrix which surround the flavor particles.

Sweetener delivery systems are well known in the art. Most recently, U.S. 4,597,970 to Sharma et al. discloses chewing gum compositions capable of effected a controlled release of the sweetener. This reference teaches a high intensity sweetener core encapsulated within a hydrophobic matrix consisting essentially of lecithin, a fatty acid or wax having a melting point in the range of 25°C to 100°C and a glyceride. This matrix requires the use of lecithin as a surface wetting agent for difficult to coat sweeteners such as aspartame. Flavoring agents are disclosed as being incorporated in the core along with the sweetener. The extension of sweetener is due entirely to the delayed release caused by the encapsulating coating.

Numerous chewing gum patents have disclosed the use of thaumatin (talin) and monellin as flavor enhancers and sweeteners. For example, U.S. 4,412,984 discloses the use of thaumatin or monellin in oral compositions at levels sufficient to enhance flavor but below the detectable sweetness threshold of these materials. Column 2 of this reference discloses chewing gum compositions containing polyvinylacetate, calcium carbonate and thaumatin, the later being disclosed as having a sweetness threshold of 0.05% and at flavor potentiation levels of 0.01 to 0.03%. The thaumatin or monellin is directed added to the oral composition without being adsorbed or encapsulated.

U.S. 4,642,235 discloses a center-filled chewing gum having the center fill comprised of thaumatin or monellin, in amounts of 5 to 100 ppm by weight, as the sweetener. The thaumatin or monellin is directly mixed with the carbohydrate syrup and flavors and incorporated into the gum shell.

U.S. 4,292,336 discloses a heat-stable sweetening composition containing a peptide, sweetener such as thaumatin, being mixed with gelatin in a weight ratio of gelatin to sweetener of 1:1 to 100:1. Incorporation of this composition into powders, tablets, dragees, semi-solids and liquids is disclosed.

U.S. 4,096,285 discloses a sweetener composition containing a protein sweetener such as thaumatin, monellin or saccharin together with a sweetener modified selected from the group consisting of aldohexuronic acids and salts, amides and lactones thereof. The modifier is present in amounts sufficient to reduce the sweet aftertaste of the sweeteners and the bitter after-taste of the saccharin.

Other patents which discuss thaumatin and monellin relate to their extraction from their source plants and purification for human consumption. Examples are 4,122,205 and 4,228,198.

Additionally, surface coating of chewing gum compositions with a rolling compound comprising from 0.5 to 100 ppm of monellin and thaumatin are taught in U.S. 4,562,076.

The prior art has focused on using thaumatin and monellin either directly into various comestible products or mixing them with gelatin or other powdered compounds to modify its sweeteners. It is apparent that a need exists for an encapsulating particulate delivery system such as the inventive one, which comprises powdered flavor composition contained in a hydrophobic matrix of fat or wax and a flavor/sweetener enhancer. The invention delivery systems are intended for use in food products, beverages, pharmaceuticals, confectionaries, chewing gum products, mouthwashes, toothpastes and other oral products intended for oral hygiene or ingestion.

The inventive delivery system contemplates a delivery system for virtually any powdered flavor compositions and combinations of these. In particular, it is especially directed to those flavors which are spray dried. The term "spray dried flavor" is meant to include the powdered product resulting from a natural or synthetic flavoring agent, e.g. an oil or essence, being adsorbed into a particulate carrier medium such as a starch, gum arabic, sugar, maltodextrin, corn syrup, polyol and the like. These spray dried materials may be formed by any conventional spray drying techniques as well as through extrusion, grinding or coacervation methods.

The delivery systems are intended to be incorporated into comestibles for the purpose of enhancing the perception of sweetness and flavor. Thus, while the addition of monellin, thaumatin and dihydochalcones and the like are incorporated for purposes known in the art, the delivery system composition as a whole is unique. By means of incorporating these flavor and sweetness enhancers into the hydrophobic encapsulating matrix, th powdered flavor is in intimate contact with th nhancers for maximum enhancement effect.

The delivery system in its final form is a particulat , free flowing material, intended to provide enhanc d flavor and sweetness to comestible compositions, said delivery system comprising:

a) a powdered flavor composition; and

b) an encapsulating matrix for said powdered flavor composition;
wherein said matrix comprises a flavor and sweetener enhancer and a hydrophobic material selected from the group consisting of fats, waxes and mixtures thereof. Spefically the present invention refers to a free flowing particulate delivery system for providing enhanced flavor and sweetness to comestible compositions, said delivery system comprising:

A) a powdered flavor composition; and

B) an encapsulating matrix for said powdered flavor composition;

Wherein said matrix comprises flavor/sweetness enhancers selected from the group consisting of thaumatin, monellin,dihydrochalcones and mixtures thereof and a hydrophobic material selected from the group consisting of waxes, fats and mixtures thereof.

As previous discussed, the powdered flavor compositions may be selected from any available flavor which is capable of being spray dried or incorporated into or onto a solid carrier composition. Sugar and polyols are the most common solid carriers used for spray drying flavors, although a variety of other conventional materials are available. The particular powdered flavor composition is not critical to the invention in any manner. Generally, a spray dried flavor composition will have carrier present in amounts of 50 to 95% by weight, with the remainder comprising flavor oils or essences. The core of the delivery system is the powdered flavor composition. In addition to the flavor composition, any member of additional ingredients may be added such as sweeteners, drugs, fiber, etc.

Surrounding the core is an encapsulating, hydrophobic matrix containing the flavor and sweetener enhancer. The hydrophobic matrix comprises a fat or wax in combination with a flavor and sweetener enhancer. The fats may be selected from any number of conventional materials such as fatty acids, glycerides, polyglycerol esters, sorbitol esters, and mixtures thereof. Examples of fatty acids include hydrogenated or partially hydrogenated vegetable oils such as palm oil, palm kernel oil, peanut oil, rapeseed oil, rice bran oil, soybean oil, cottonseed oil, sunflower oil, safflower oil and mixtures thereof. Other fatty acid oils are contemplated. Glycerides which are useful include mono-,di-and triglycerides.

Waxes useful are chosen from among the group consisting of natural or synthetic waxes and mixtures thereof. Nonlimiting examples include paraffin wax, petrolatum, carbowax, microcrystalline wax, beeswax, carnuba wax, candellila wax, lanolin, bayberry wax, sugar cane, spermaceti wax, rice bran wax and combinations thereof.

The fats and waxes may be used individually or in combination in amounts varying from 10 to 70% by weight of the delivery system, and preferably in amounts of 40 to 58% by weight. When used as a combination, the fat and wax are preferably present in a ratio of 70:10 to 85:15 of fat to wax. The hydrophobic matrix should have a melting point below 100°C to ensure it will not require temperatures above those which will denature or degrade the flavor/sweetener enhancers during preparation.

The flavor/sweetener enhancers may be chosen from numerous well known enhancer ingredients but of particular importance in the instant invention are thaumatin, monellin and hydrochalcones. Mixtures of these are useful. The flavor/sweetener enhancers are intended to be used at levels which are sufficient to impart an enhanced effect to the flavor or sweetness present in the comestible product into which they are added. They may be present in amounts of from 1 to 30% by weight of the delivery system, but preferably in amounts of 5 to 20% and most preferably in amounts of 5 to 10% by weight.

It is well known that soluble proteins such as thaumatin and monellin are stable at certain temperatures below 100°C and at a pH of 5.5. The literature has disclosed thaumatin to be 2,000 to 3,000 times the sweetness of sugar, with a solubility of 60g/100 ml water. It is known also that the use of these proteins as sweeteners results in a slight delay of sweetness perception, presumably due to the gradual build-up of the sweetener concentration to the perceptible thresholds level. These properties render these materials very susceptible to variations in pH, heat, water and chemical exposure when incorporated into products such as comestibles and particularly in chewing gum compositions. This concern is of little moment in the inventive delivery systems, however, due to the protective nature of the hydrophobic matrix.

The process of preparing the delivery systems in one embodiment comprises providing a homogeneous, hydrophobic molten mixture comprising a fat or wax at a temperature below the denaturizing or degrading level of the sweetener/flavor enhancer (e.g., below 100°C); admixing the sweetener/flavor enhancer to obtain homogeniety, while maintaining the temperature below 100°C and more specifically at 85 to 95°C; spraying the thus formed hydrophobic/flavor enhancer into a stream of suspended flavor particles such that hydrophobic mixture coats the flavor particles and simultaneously congeals to form a dry, particulate delivery system having an enhanced flavor/sweetener capability.

In another embodiment, the flavor particles can b directly admixed with th molten hydrophobic/flavor enhancer mixture and then spread into sheets, allowed to cool and then ground into suitable particle sizes for use in comestible products. This method has disadvantages, however, since grinding tends to disrupt

the continuity of the coating around the flavor particles and may result in a loss of enhancement provided by the intimate contact between the flavor enhancement component and the flavor particle itself. Thus, while it is useful in practicing the instant invention, it is preferred to use the spray congealing method described above.

As previously mentioned, the hydrophobic coating provides both a protective barrier to prevent interaction between the flavor particles and other components or chemicals present in a particular product, as well as providing a means to maintain a flavor/sweetener enhancer in intimate contact with the flavor particles. While it is not critical that the hydrophobic coating be a particular thickness, it should be present to effectively coat the flavor particles. If additional coating is required the delivery system particles can be left suspended in the air stream and additional spraying with the molten mixture can be performed.

As mentioned above, the delivery systems are useful in any number of comestible products. In particular, chewing gum, confectionary, pharmaceutical preparations, as well as other food products such as baked goods are among those comestible products which would benefit through enhanced flavor/sweetness provided by the inventive delivery system.

With regard to the chewing gum formulation in which the novel delivery system is employed, the amount of gum base employed will vary greatly depending on various factors such as the type of base used, consistency desired and other components used to make the final product. In general, amounts of 5% to 45% by weight of the final chewing gum composition are acceptable for use in chewing gum compositions with preferred amounts of 15% to 25% by weight. The gum base may be any water-insoluble gum base well known in the art. Illustrative examples of suitable polymers in gum bases include other natural and synthetic elastomers and rubbers. For example, those polymers which are suitable in gum bases, include, without limitation, substances of vegetable origin such as chicle, gelutong, gutta percha and crown gum. Synthetic elastomers such as butadiene-styrene copolymers, isobutylene-isoprene copolymers, polyethylene, polyisobutylene and polyvinylacetate and mixtures thereof, are particularly useful.

The gum base composition may contain elastomer solvents to aid in softening the rubber component. Such elastomer solvents may comprise methyl, glycerol or pentaerythritol esters of rosins or modified rosins, such as hydrogenated, dimerized or polymerized rosins or mixtures thereof. Examples of elastomer solvents suitable for use herein include the pentaerythritol ester of partially hydrogenated wood rosin, pentaerythriol ester of wood rosin, glycerol ester of wood rosin, glycerol ester of partially dimerized rosin, glycerol ester of polymerized rosin, glycerol ester of tall oil rosin, glycerol ester of wood rosin and partially hydrogenated wood rosin and partially hydrogenated methyl ester of rosin, such as polymers of alpha-pinene or beta-pinene; terpene resins including polyterpene and mixtures thereof. The solvent may be employed in an amount ranging from 10% to 75% and preferably 45% to 70% by weight to the gum base.

A variety of traditional ingredients such as plasticizers or softeners such as lanolin, stearic acid, sodium stearate, potassium stearate, glyceryl triacetate, glycerine and the like are useful, as well as natural waxes and petroleum waxes, such as polyurethane wares, paraffin waxes and microcrystalline waxes. These ingredients may also be incorporated into the gum base to obtain a variety of desirable textures and consistency properties. These additional materials are generally employed alone or in combination in amounts of up to 30% by weight and preferably in amounts of from 3% to 20% by weight of the final gum base composition.

The chewing gum composition may additionally include the conventional additives of flavoring agent, coloring agents such as titanium dioxide; emulsifiers such as lecithin and glyceryl monostearate; and additional fillers such as aluminum hydroxide, alumina, aluminum silicates, calcium carbonate, and talc and combinations thereof. These fillers may also be used in the gum base in various amounts. Preferably the amount of fillers when used will vary from 4% to 30% by weight of the final chewing gum.

In the instance where auxiliary sweeteners are utilized in addition to those in the delivery system, the present invention contemplates the inclusion of those sweeteners well known in the art, including both natural and artificial sweeteners. Thus, additional sweeteners may be chosen from the following non-limiting list: sugars such as sucrose, glucose (corn syrup), dextrose, invert sugar, fructose, and mixtures thereof; chlorinated sucrose compounds such as sucralose and its derivatives; acid saccharin and its various salts such as the sodium saccharin or calcium saccharin; cyclamic acid and its various salts such as the sodium salt; the dipeptide sweeteners such as aspartame and various derivatives known to be sweet; dihydrochalcone compounds; glycyrrhizin; Stevia rebaudiana (Stevioside); and sugar alcohols such as sorbitol, sorbitol syrup, mannitol, xylitol, and the like. Also contemplated as an additional sweetener is the nonfermentable sugar substitut (hydrogenated starch hydrolysate) which is described in U.S. Reissue patent 26,959. Also contemplated is the synthetic sweetener 3,6-dihydro-6-methyl-1-1,2,3-oxathiazin-4-one-2,2-dioxide particularly the potassium (Acesulfame-K), sodium and calcium salts thereof as described in Germany Patent No. 2,001,017.7.

Suitable flavorings include both natural and artificial flavors, and mints such as peppermint, menthol, artificial vanilla, cinnamon, various fruit flavors, both individual and mixed, and the like are contemplated. The flavorings are generally utilized in amounts that will vary depending upon the individual flavor, and may, for example, range in amounts of 0.5% to 3% by weight of the final chewing gum composition weight. The flavorings may be present in the delivery system, in the chewing gum composition itself, or both.

The colorants useful in the present invention, include the pigments such as titanium dioxide, and may be incorporated in amounts of up to 1% by weight, and preferably up to 0.6% by weight. Also, the colorants may include other dies suitable for food, drug and cosmetic applications, and known as F.D. & C. dyes and the like. The materials acceptable for the foregoing spectrum of use are preferably water-soluble. Illustrative examples include indigold die, known as F.D. & C. Blue No. 2, which is the disodium salt of 5,5'-indigotindisulfonic acid. Similarly, the dye known as F.D. & C. Green No. 1, comprises a triphenyl-methane dye and is the monosodium salt of 4-[4-N-ethyl-p-sulfobenzylamino) diphenylmethylene]-[1-(N-ethyl-N-p-sulfoniumbenzyl)- 2,5-cyclohexadienimine]. A full recitation of all F.D. & C. and D. & C. and other corresponding chemical structures may be found in the Kirk-Othmer Encyclopedia of Chemical Technology, in Volume 5, at pages 857-884, which text is accordingly incorporated herein by reference.

The chewing guns of the invention may be in any form known in the art, such as stick gum, slab gum, chunk gum, shredded gum, hard coated gum, tabletted gum, as well as center-filled gum.

The process of preparing the inventive chewing gum compositions is as follows. The gum base is melted (85° to 90°C), cooled to 78°C and placed in a pre-warmed (60°C) standard mixing kettle equipped with sigma blades. The emulsifier (lecithin) is added and mixed. Next, a portion of the sugar alcohol (sorbitol) and the softener (glycerin) is added and mixed for an additional 3 to 6 minutes. The mixing kettle is cooled and the additional sweetener (mannitol) and the remainder of the sorbitol and glycerin are then added and mixing is continued. At this time, the unflavored chewing gum temperature is 39-42°C. Flavor oil is then added and incorporated into the base and the mixing is continued. Finally, the delivery system containing the core material is added and mixed for an additional 1 to 10 minutes. The delivery system is added as the last ingredient. The final gum temperature is 39°C-43°C. The chewing gum composition is then discharged from the kettle, rolled, scored and formed into chewing gum pieces.

The following examples further illustrate the invention.

All percentages throughout the specification are by weight % of the final delivery system unless otherwise indicated.

EXAMPLE I

Delivery systems of the instant invention were prepared in accordance with the following method. A mixture comprising 56.67% hard palm oil and 10% wax wee melted in a kettle and blended to form a molten, homogeneous mixture. The melting point of the mixture was below 100° to avoid any possibility of denaturizing the flavor enhancer (e.g. thaumatin), which would result in loss of flavor and sweetness enhancing capability. The mixture was then combined with the 5% by weight thaumatin and mixing was continued to obtain homogeneity, while still keeping the temperature below 100°C. More specifically, the temperature was kept at 85° to 95°C. The encapsulation matrix was now ready to be fed into a spray congealing apparatus (Glatt GPC-15) fluidized bed granulator where is would be used to coat a fluidized bed of the powdered spray-dried flavor. The flavor particles were suspended in the granulator stream of cool air into which the encapsulation matrix was sprayed or atomized. Upon contact with the cooler air temperature and fluidized flavor particles, the molten encapsulating matrix solidified onto the flavor particles and passed out of the upward air stream. The nozzle pressure and temperature was regulated to control the final particle droplet size. The result was a dry particle or agglomerate, referred to herein as the delivery system, having an approximate elliptical or spherical shape. The delivery system particles could then be sized for a particular application or allowed to remain in the granulator to obtain additional encapsulation coats.

EXAMPLE 2

The inventive delivery system was formed using the procedure of Example I whereby 10% of hard palm oil, 10% of paraffin wax, 30% of thaumatin and 50% of the spray dried flavor w r used. Th resultant product was dry, free-flowing and was capabl of d livering a flavor/sweetness enhanc ment.

EXAMPLE 3

The procedure of Example 1 was repeated using 40$% soybean oil, 25% microcrystalline wax, 10% thaumatin and 25% spray dried flavor.

EXAMPLE 4

The procedure of Example 1 was repeated using the same ingredients only monellin was used to replace the thaumatin.

EXAMPLE 5

The procedure of Example 1 was repeated using 70% rapeseed oil, 20% paraffin wax, 5% thaumatin and 5% spray dried flavor

EXAMPLE 6

The procedure of Example 1 was repeated using 59.5% cottonseed oil, 5% carbo wax, 10% thaumatin and 20% spray dried flavor.

EXAMPLE 7

The procedure of Example 1 was repeated using the same ingredients except the solid high intensity sweetener aspartame was additionally incorporated with the powdered spray dried flavor, resulting in a delivery system encapsulating both flavor and sweetener.

EXAMPLE 8

The procedure of Example 1 was repeated using the same ingredients except the solid sweetener saccharin was additionally incorporated with the powdered spray dried flavor, resulting in a delivery system encapsulating both flavor and sweetener.

EXAMPLE 9

Sugar chewing gum compositions containing the novel delivery systems from previous examples were prepared in accordance with the formulations set forth below, employing conventional gum making techniques.

TABLE I
Sugar Chewing Gum Compositions Containing

Ingredient	Compositions - % Weight						
	Control	P-1	P-2	P-3	I-1	I-2	I-3
Delivery System							
Example 1	--	--	--	--	0.005	0.015	0.03
* Free thaumatin (in liquid flavor)	--	0.005	0.015	--	--	--	--
Free thaumatin (in spray dried flavor)	--	--	--	0.015	--	--	--
Gum base	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Sugar	66.4	66.395	66.3	66.37	66.3	66.4	66.37
Filler	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Softener	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Color	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Liquid flavor	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Spray dried flavor	0.5	0.5	0.59	0.53	0.5	0.5	0.53

* Thaumatin was first admixed with the flavor and then added to the chewing gum composition.

EXAMPLE 10

Sugarless chewing gum compositions containing the novel delivery system from previous examples were set forth below, employing conventional gum making techniques.

Table II

Ingredient	Sugarless Chewing Gum Composition % Weight			
	P-4	P-5	I-4	I-5
Delivery System Example 1	_	-	0.015	0.015
*Free Thaumatin (in liquid flavor)	-	0.015	-	-
Free Thaumatin (in spray dried flavor)	0.0005	-	-	-
Gum Base	23	23	23	23
Filler	-	-	2.9	2.9
Polyol	62	52.4	58.5	58.4
Aspartame	-	-	-	0.2
Saccharin	-	-	0.14	-
Softener	12.5	12.5	13.5	13.5
Color	0.2	0.2	0.5	0.1
Liquid Flavor	1.2	1.2	1.5	1.5
Spray Dried Flavor	0.5	-	-	-

*Thaumatin was first admixed with the flavor and then added to the chewing gum composition.

SENSORY EVALUATION TESTS

An expert panel test was conducted on several chewing gum compositions having 0.015% thaumatin incorporated therein. The panelist were asked to rate flavor and sweetness enhancement on a hedonic scale of 0 – 100, where "0" represents very poor flavor and sweetness and 100 represent excellent (high) flavor and sweetness enhancement. Ratings for each composition were recorded at chew intervals of 0.5, 2, 6, 10 and 15 minutes. The results are depicted in the graph of Figure I.

The graph in Figure I shows panels evaluation results (blind studies) for four different chewing gum compositions. These compositions are taken from Table I. The control composition ("C") does not contain any form of a flavor enhancement and is representative of a commercially available, prior art chewing gum composition. Curve "D" on the graph represents P – 3, which is a composition containing free thaumatin without the inventive delivery system encapsulation. Curve "F" represents P – 2 wherein free thaumatin is admixed with liquid flavor and added directly to the gum composition. Curve "E" is representative of a ch wing gum composition containing the inventive delivery system, namely I – 2. It is clear from Table I that each of these compositions tested had formulations that except for the pr senc of d livery systems were otherwise substantially the same.

As clearly indicated by the curves. chewing gum compositions containing the inventiv delivery system exhibited a significantly higher sweetener/flavor enhancement at all tested intervals of chew time. The most significant difference, however, is at the 15 minute chew interval, where gum compositions containing the delivery system were assigned a score of 30 as compared to scores of 0, 14, and 20. At all times through the chew intervals, the inventive composition gave higher perceived sweetener and flavor enhancement than any of the prior art compositions.

Claims

1. A free flowing particulate delivery system for providing enhanced flavor and sweetness to comestible compositions, said delivery system comprising:
   A) a powdered flavor composition; and
   B) an encapsulating matrix for said powdered flavor composition;
   Wherein said matrix comprises flavor/sweetness enhancers selected from the group consisting of thaumatin, monellin,dihydrochalcones and mixtures thereof and a hydrophobic material selected from the group consisting of waxes, fats and mixtures thereof.

2. The delivery system of claim 1 wherein the powdered flavor composition is a spray dried natural or artificial flavor or essence.

3. The delivery system of claim 2 wherein the spray dried flavor is selected from the group consisting of spearmint flavor, peppermint flavor, cinnamon flavor, fruit flavors, fruit essences, kola flavor, kola extract and mixtures thereof.

4. The delivery system of claim 1 wherein the flavor composition is present in amounts of 5 to 50% by weight, preferably is present in amounts of 20 to 30% by weight.

5. The delivery system according to anyone of the claims 1 to 4 wherein the flavor/sweetness enhancer is present in amounts of 1 to 20% by weight; and the hydrophobic material is present in amounts of 10 to 70% by weight.

6. The delivery system of claim 1 wherein the flavor enhancer is present in amounts sufficient to produce a perceived sweetness as well as flavor enhancement.

7. The delivery system according to anyone of the claims 1 to 6, wherein the hydrophobic fat material is a fatty acid selected from the group consisting of hydrogenated or partially hydrogenated oils.

8. The delivery system of claim 7 wherein the hydrogenated or partially hydrogenated oils are selected from the group consisting of palm oil, palm kernel oil, peanut oil, rapeseed oil, rice bran oil, soybean oil, cottonseed oil, sunflower oil, safflower oil and mixtures thereof.

9. The delivery system according to anyone of the claims 1 to 8 wherein the hydrophobic fat material is selected from the group consisting of monoglycerides, diglycerides, triglycerides, polyglycerol esters, sorbitol esters and mixtures thereof.

10. The delivery system according to anyone of the claims 1 to 9 wherein the hydrophobic fat material is present in amounts of 45 to 55% by weight.

11. The delivery system according to the claims 1 to 10 wherein the hydrophobic wax material is selected from the group consisting of natural waxes, synthetic waxes and mixtures thereof.

12. The delivery system of claim 11 wherein the hydrophobic wax material is selected from the group consisting of paraffin wax, beeswax, carnuba wax, candelilla wax, lanolin, bayberry wax, sugar cane, petrolatum, carbowax, spermaceti wax, rice bran wax, microcrystalline wax and mixtures thereof.

13. A process of preparing a flavor delivery system capabl of providing flavor encapsulation as well as enhanced flavor and sweetness as claimed in anyone of the claims 1 to 12 comprising the steps of:

A) providing a molten homogeneous mixture of fat, wax or mixtures thereof and maintaining this mixture at a temperature below the denaturization temperature of thaumatin, monellin or dihydrochalcones;
B) adding thaumatin, monellin, dihydrochalcones or mixtures thereof to the molten mixture at a temperature of 70 to 90 ° C and mixing to obtain homogeneity;
C) providing a fluidizing air stream of a powdered flavor composition having a temperature below the melting point of the molten mixture of B);
D) spraying the molten mixture of B) onto the fluidized stream of powdered flavor composition to form a congealed encapsulation coating on said powdered flavor composition.

14. The process of claim 13 wherein the molten mixture is formed at a temperature sufficient to remain molten but below 100 ° C.

15. The process of claim 13 wherein the molten encapsulation is formed at a temperature sufficient to remain molten but below about 80 ° C.

16. The process of claim 13 wherein the spray rate of the molten mixture is kept at 15 to 20 ml/minute and the temperature of the fluidized air stream of powdered spray dried flavor is 70 ° to 75 ° C.

17. The process of claim 13 wherein the homogeneous molten mixture provided in step A) comprises a material selected from the group consisting of natural or synthetic waxes, hydrogenated or partially hydrogenated fatty acids, monoglycerides, diglycerides, triglycerides, sorbitol esters, polyglycerol esters and mixtures thereof.

Patentansprüche

1. Freifließendes teilchenförmiges Abgabesystem zur Aroma - und Süßeverstärkung bei eßbaren Massen, umfassend
A) eine pulverförmige Geschmacks - oder Aromastoffmasse und
B) eine einkapselnde Matrix für die pulverförmige Geschmacks - oder Aromastoffmasse,
wobei die Matrix Aroma - /Süße - Verstärker aus der Gruppe Thaumatin, Monellin, Dihydrochalcone und Mischungen derselben und eine hydrophobes Material aus der Gruppe Wachse, Fette und Mischungen derselben enthält.

2. Abgabesystem nach Anspruch 1, wobei die pulverförmige Geschmacks - oder Aromastoffmasse aus einem sprühgetrockneten natürlichen oder künstlichen Aroma - oder Geschmacksstoff oder einer natürlichen oder künstlichen Essenz besteht.

3. Abgabesystem nach Anspruch 2, wobei der sprühgetrocknete Aroma - oder Geschmacksstoff aus der Gruppe Spearmintgeschmack, Pfefferminzgeschmack, Zimtgeschmack, Fruchtgeschmack, Fruchtes - senzen, Colageschmack, Colaextrakt und Mischungen derselben besteht.

4. Abgabesystem nach Anspruch 1, wobei die Geschmacks - oder Aromastoffmasse in Mengen von 5 bis 50, vorzugsweise 20 bis 30 Gew.% vorhanden ist.

5. Abgabesystem nach einem der Ansprüche 1 bis 4, wobei der Aroma - /Süße - Verstärker in Mengen von 1 bis 20 Gew.% und das hydrophobe Material in Mengen von 10 bis 70 Gew.% vorhanden sind.

6. Abgabesystem nach Anspruch 1, wobei der Aromaverstärker in Mengen vorhanden ist, die ausreichen, eine wahrgenommene Süße - sowie Aromaverstärkung herbeizuführen.

7. Abgabesystem nach einem der Ansprüche 1 bis 6, wobei das hydrophobe Fettmaterial aus einer Fettsäure aus der Gruppe hydrierte oder teilhydrierte Öle besteht.

8. Abgabesystem nach Anspruch 7, wob i die hydri rten oder teilhydri rten Öl aus der Gruppe Palmöl oder Palmkernöl, Erdnußöl, Rapssaatöl, Reiskleieöl, Sojabohn nöl, Baumwollsaatöl, Sonnenblumenöl, Safloröl und Mischungen derselben ausgewählt ist.

9. Abgabesystem nach einem der Ansprüche 1 bis 8, wobei das hydrophobe Fettmat rial aus der Gruppe Monoglyzeride, Diglyzeride, Triglyzeride, Polyglzerinester, Sorbitester und Mischungen derselben aus - gewählt ist.

10. Abgabesystem nach einem der Ansprüche 1 bis 9, wobei das hydrophobe Fettmaterial in Mengen von 45 bis 55 Gew.% vorhanden ist.

11. Abgabesystem nach den Ansprüchen 1 bis 10, wobei das hydrophobe Wachsmaterial aus der Gruppe natürliche Wachse, synthetische Wachse und Mischungen derselben ausgewählt ist.

12. Abgabesystem nach Anspruch 11, wobei das hydrophobe Wachsmaterial aus der Gruppe Paraffin - wachs, Bienenwachs, Carnubawachs, Candellilawachs, Lanolin, Lorbeerwachs, Zuckerrohr, Vaseline, Carbowachs, Spermacetiwachs, Reiskleiewachs, mikrokristallines Wachs und Mischungen derselben ausgewählt ist.

13. Verfahren zur Zubereitung eines Aromaabgabesystems mit der Fähigkeit zur Aromaeinkapselung sowie einer Aroma - und Süßeverstärkung nach einem der Ansprüche 1 bis 12 durch folgende Stufen:
A) Bereitstellen eines aufgeschmolzenen homogenen Gemischs aus Fett, Wachs oder Mischungen derselben und Halten dieses Gemischs bei einer Temperatur unterhalb der Denaturierungstempe - ratur von Thaumatin, Monellin oder Dihydrochalconen;
B) Zugabe von Thaumatin, Monellin, Dihydrochalconen oder Mischungen derselben zu dem aufge - schmolzenen Gemisch bei einer Temperatur von 70 bis 90 °C und Vermischen bis zur Homogenität;
C) Erzeugen eines aufgewirbelten Luftstroms einer pulverförmigen Aromastoff - oder Geschmacks - stoffmasse einer Temperatur unterhalb des Fließpunktes des aufgeschmolzenen Gemischs gemäß B) und
D) Aufsprühen des aufgeschmolzenen Gemischs gemäß B) auf den aufgewirbelten Strom der pulverförmigen Aromastoff - oder Geschmacksstoffmasse zur Bildung eines erstarrten Einkapse - lungsüberzugs auf der pulverförmigen Aromastoff - oder Geschmacksstoffmasse.

14. Verfahren nach Anspruch 13, wobei das aufgeschmolzene Gemisch bei einer zur Erhaltung des Schmelzezustands ausreichenden, jedoch unterhalb 100 °C liegenden Temperatur gebildet wird.

15. Verfahren nach Anspruch 13, wobei die aufgeschmolzene Einkapselung bei einer zur Erhaltung des Schmelzezustands ausreichenden, jedoch unterhalb etwa 80 °C liegenden Temperatur gebildet wird.

16. Verfahren nach Anspruch 13, wobei die Sprühgeschwindigkeit des aufgeschmolzenen Gemischs bei 15 bis 20 ml/min liegt und die Temperatur des aufgewirbelten Luftstroms des pulverförmigen sprühge - trockneten Aroma - oder Geschmacksstoffs 70 ° bis 75 °C beträgt.

17. Verfahren nach Anspruch 13, wobei das in Stufe A) bereitgestellte homogene aufgeschmolzene Gemisch ein Material aus der Gruppe natürliche oder synthetische Wachse, hydrierte oder teilhydrierte Fettsäuren, Monoglyzeride, Diglyzeride, Triglyzeride, Sorbitester, Polyglyzerinester und Mischungen derselben enthält.

Revendications

1. Système particulaire de libération s'écoulant librement pour fournir un arôme et une édulcoration accrus à des compositions comestibles, ce système de libération comprenant:
A) une composition d'arôme pulvérulente; et
B) une matrice d'encapsulation pour cette composition d'arôme pulvérulente;
dans lequel cette matrice comprend des agents augmentant l'arôme et l'édulcoration, choisis dans le groupe consistant en thaumatine, monelline, dihydrochalcones et leur mélange et une matière hydro - phobe choisie dans le groupe consistant en cires, graisses et leur mélange.

2. Système de libération suivant la revendication 1, dans lequel la composition d'arôme pulvérulente est une essence ou un arôm artificiel ou natur l séché par atomisation.

3. Système de libération suivant la revendication 2, dans lequel l'arôme séché par atomisation est choisi dans le groupe consistant en arôme de menthe poivrée, arôme de menthe verte, arôme de cannelle, arôme de fruits, essence de fruits, arôme de kola, extrait de kola et leurs mélanges.

4. Système de libération suivant la revendication 1, dans lequel la composition d'arôme est présente en des quantités de 5 à 50% en poids, de préférence en des quantités de 20 à 30% en poids.

5. Système de libération suivant l'une quelconque des revendications 1 à 4, dans lequel l'agent augmentant l'arôme et l'édulcoration est présent en des quantités de 1 à 20% en poids et la matière hydrophobe est présente en des quantités de 10 à 70% en poids.

6. Système de libération suivant la revendication 1, dans lequel l'agent augmentant l'arôme est présent en des quantités suffisantes pour produire une augmentation perçue de l'édulcoration et de l'arôme.

7. Système de libération suivant l'une quelconque des revendications 1 à 6, dans lequel la matière grasse hydrophobe est un acide gras choisi dans le groupe consistant en huiles hydrogénées ou partiellement hydrogénées.

8. Système de libération suivant la revendication 7, dans lequel les huiles hydrogénées ou partiellement hydrogénées sont choisies dans le groupe consistant en l'huile de palme, l'huile de noyaux de palme, l'huile d'arachide, l'huile de colza, l'huile de son de riz, l'huile de soja, l'huile de coton, l'huile de tournesol, l'huile de cartame et leurs mélanges.

9. Système de libération suivant l'une quelconque des revendications 1 à 8, dans lequel la matière grasse hydrophobe est choisie dans le groupe consistant en monoglycérides, diglycérides, triglycérides, esters de polyglycérol, esters de sorbitol et leurs mélanges.

10. Système de libération suivant l'une quelconque des revendications 1 à 9, dans lequel la matière grasse hydrophobe est présente en des quantités de 45 à 55% en poids.

11. Système de libération suivant l'une des revendications 1 à 10, dans lequel la matière cireuse hydrophobe est choisie dans le groupe consistant en cires naturelles, cires de synthèse et leurs mélanges.

12. Système de libération suivant la revendication 11, dans lequel la matière cireuse hydrophobe est choisie dans le groupe consistant en cire de paraffine, cire d'abeille, cire de carnuba, cire de candelilla, lanoline, cire d'arbre à cire, sucre de cane, vaseline, carbowax, cire de spermaceti, cire de son de riz, cire microcristalline et leurs mélanges.

13. Procédé pour préparer un système de libération d'arôme capable de fournir une encapsulation d'arôme ainsi qu'une édulcoration et un arôme accrus suivant l'une quelconque des revendications 1 à 12, comprenant les étapes de:

A) fourniture d'un mélange homogène fondu de graisses, cires ou leurs mélanges et maintient de ce mélange à une température inférieure à la température de dénaturation de la thaumatine, de la monelline ou des dihydrochalcones;

B) addition de thaumatine, monelline, dihydrochalcones ou leurs mélanges en mélange fondu à une température de 70 à 90 ° C et mélange jusqu'à homogénéité;

C) fourniture d'un courant d'air fluidisant une composition d'arôme pulvérulente ayant une tempéra – ture inférieure au point de fusion du mélange fondu préparé par B);

D) pulvérisation du mélange fondu de B) sur le courant fluidisé de composition d'arôme pulvérulente façon à former un revêtement d'encapsulation par solidification sur cette composition d'arôme pulvérulente.

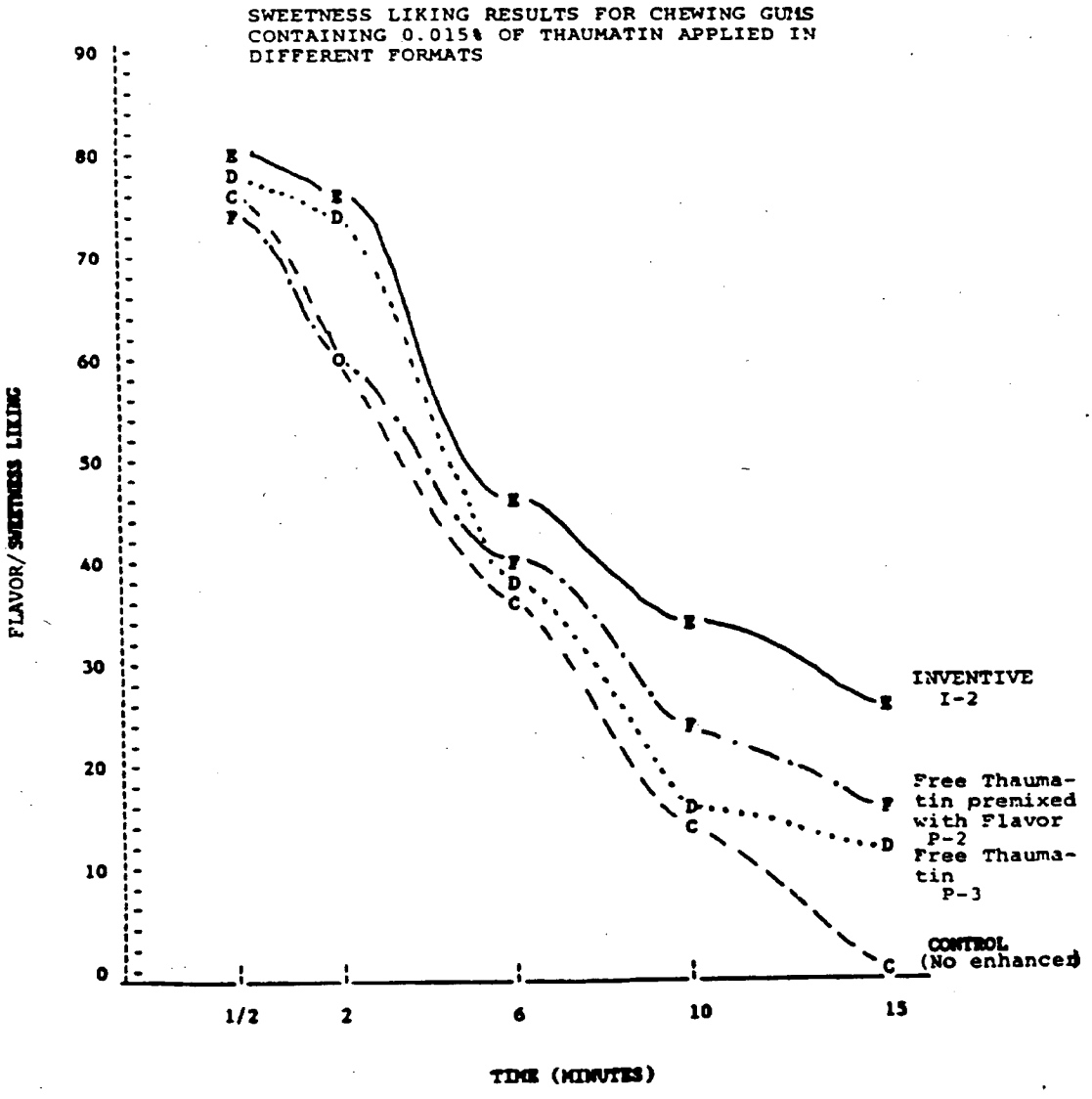
14. Procédé Suivant la revendication 13, dans lequel le mélange fondu est formé à une température suffisante pour qu'il reste fondu mais inférieure à 100 ° C.

15. Procédé suivant la revendication 13, dans lequel l'encapsulation par la masse fondue est formée à une température suffisante pour que la masse reste fondue mais inférieure à 80 ° C.

16. Procédé suivant la revendication 13, dans lequel l débit d'atomisation du mélange fondu est maintenu entre 15 et 20 ml/minute et la température du courant d'air fluidisant l'arôme pulvérulent séché par atomisation est de 70 à 75 °C.

17. Procédé suivant la revendication 13, dans lequel le mélange fondu homogène fourni dans l'étape A comprend une matière choisie dans le groupe consistant en cires naturelles ou synthétiques, acides gras hydrogénés ou partiellement hydrogénés, monoglycérides, diglycérides, triglycérides, esters de sorbitol, esters de polyglycérol et leurs mélanges.

FIG.1


SWEETNESS LIKING RESULTS FOR CHEWING GUMS CONTAINING 0.015% OF THAUMATIN APPLIED IN DIFFERENT FORMATS
FLAVOR/SWEETNESS LIKING
90
80
70
60
50
40
30
20
10
0
1/2
2
6
10
15
TIME (MINUTES)
INVENTIVE I-2
Free Thaumatin premixed with Flavor P-2
Free Thaumatin P-3
CONTROL (No enhancer)